

1.4 EQUATORIAL RADAR SYSTEM

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A large clear air radar with the sensitivity of an incoherent-scatter radar for observing the whole equatorial atmosphere up to 1000 km altitude is now being designed in Japan. The radar, called the Equatorial Radar, will be built in Pontianak, Kalimantan Island, Indonesia (0.03 deg north, 109.3 deg east). The system is a 47-MHz monostatic Doppler radar with an active phased array configuration similar to that of the MU radar in Japan, which has been in successful operation since 1983. It will have a PA product of more than $5 \times 10^9 \text{ Wm}^2$ (P = average transmitter power, A = effective antenna aperture) with sensitivity more than 10 times that of the MU radar. This system configuration enables pulse-to-pulse beam steering within 25 deg from the zenith. As is the case of the MU radar, a variety of sophisticated operations will be made feasible under the supervision of the radar controller. A brief description of the system configuration will be presented.

TABLE 1. Basic Parameters of the International Equatorial Radar.

Parameter	Value
Location	Pontianak, West Kalimantan, Indonesia (0.03°N, 109.29°E)
Radar system	Monostatic pulse radar; active phased array system
Operation frequency	47 MHz
Antenna	Circular array of ~ 2,500 crossed Yagis
aperture	~ 60,000 m ² (~280 m in diameter)
beam width	1.2° (one way; half power for full array)
steerability	Steering is completed in each IPP
beam directions	~ 2,000: 0°–20° off zenith angle
polarizations	Circular
Transmitter	~ 2,500 solid-state amplifiers (TR modules; each with output power of ~ 500 W peak and ~ 25 W average)
peak power	~ 1.1 MW (maximum)
average power	~ 55 kW (duty ratio 5%)(maximum)
bandwidth	~ 2 MHz (maximum) (pulse width: 1–512 μs variable)
IPP	200 μs to 65 ms (variable)
Receiver	
bandwidth	~ 2 MHz (maximum)
IF	5 MHz
A/D converter	12–16 (not fixed) bits x 8 channels
Pulse compression	binary phase coding up to 32 elements; Barker and complementary codes presently in use

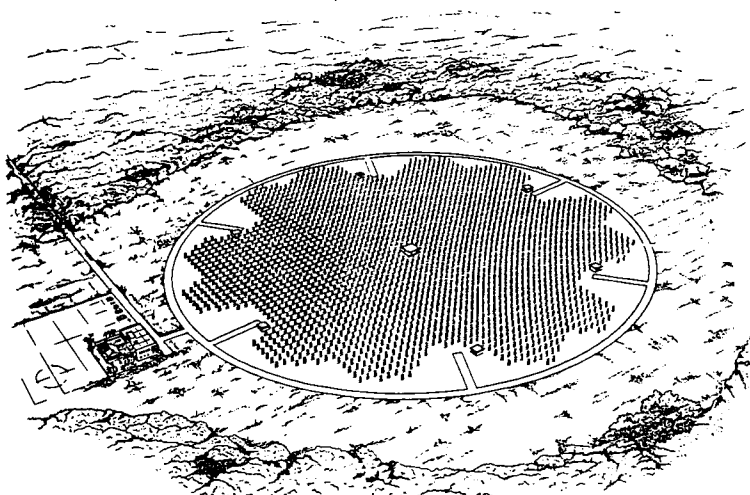


Figure 1. Artist's conception of the equatorial radar.

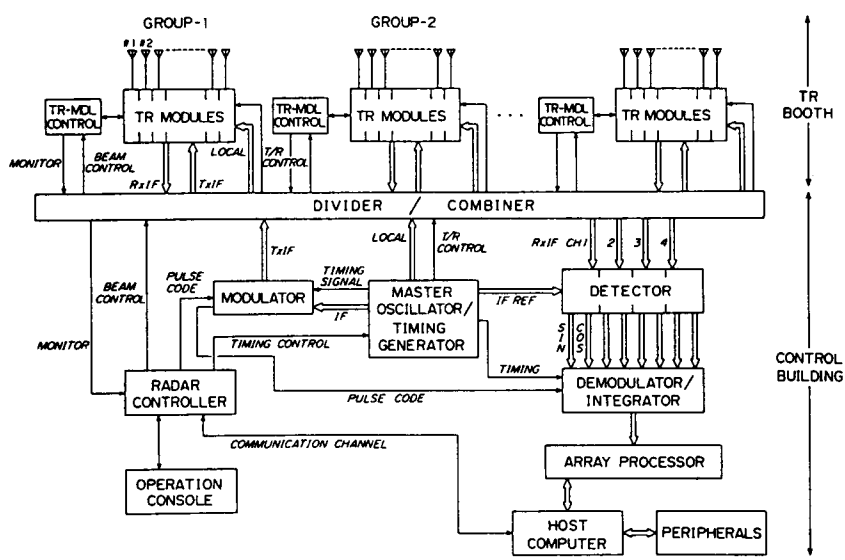


Figure 2. General block diagram of the equatorial radar.

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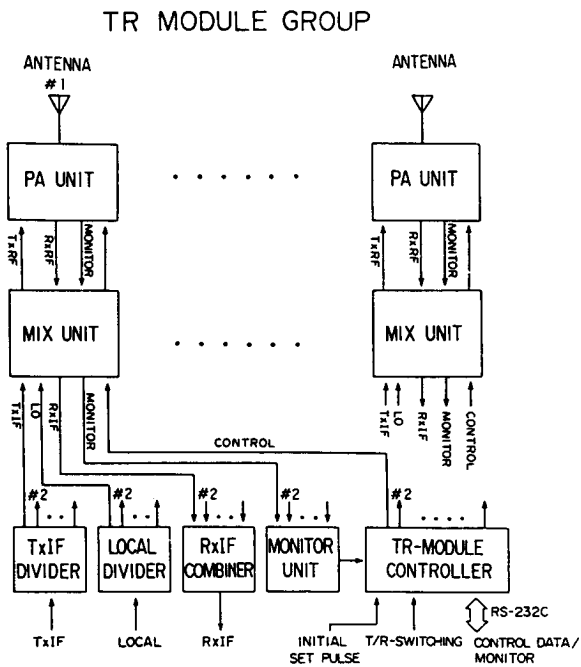


Figure 3. Block diagram of one group of TR modules.